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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/630,520

07/30/2003

Barry M. Verdcgan

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06/29/2007

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EXAMINER

MATZEK, MATTHEW D

ART UNIT

PAPER NUMBER

1771

MAIL DATE

DELIVERY MODE

06/29/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/630,520

Applicant(s)

VERDEGAN ET AL.

Examiner

Matthew D. Matzek

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1771

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2007.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 105-109 and 111-132 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 105-109 and 111-132 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

Response to Amendment

1. The amendment dated 4/18/2007 has been fully considered and entered into the Record. Claim 110 has been canceled, claims 108 and 111 have been amended and new claims 114-132 have been added. The amended and new claims contain no new matter. Claims 105-109 and 111-132 are currently active.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. The term "sufficiently different surface charge" in claim 108 is a relative term, which renders the claim indefinite. The term "sufficient" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 106-109, 117, 118, 120, 121, 123, 124, 126, 127 and 129-131 are rejected under 35 U.S.C. 102(b) as being anticipated by Fischer (US 5,800,706).

a. Fischer teaches the creation of a porous material made from nanofiber packed beds by blending nanofibers with scaffold particulates having larger dimensions to prevent the nanofiber bed from collapsing (Abstract). The nanofibers preferably have diameters less than 500 nanometers (col. 4, lines 25-31). The scaffold particulate is preferably a fiber (col. 7, lines 26-30) and preferably has a diameter of greater than 1

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micron (col. 7, lines 11-19). The scaffold particulates and nanofibers may be polymeric, inorganic, glass or metallic and may have the same or different composition from one another (col. 7, lines 40-44). One embodiment of the invention comprises a third particle or fiber (col. 10, lines 42-47).

b. The applied reference provides for inorganic coarse fibers (i.e. ceramic) and carbon nanofibers. Ceramics are inherently hydrophilic and oleophobic and carbon nanofibers are hydrophobic and oleophilic. This provides for the instantly claimed wettabilities of claim 106 when the packed bed is used with an oil-based liquid and claim 107 when the liquid is water-based. Fischer provides for nanofibers and scaffold fibers of differing composition and said nanofibers/fibers are of the same composition as those of Applicant. Therefore, they would possess the same triboelectric properties as those instantly claimed. Their combination as outlined above would provide for the instantly claimed localized electric field. Claim 109 is rejected as the packed bed preferably has uniform physical properties along at least one-dimensional axis (col. 9, lines 15-23). This allows for a buildup of nanofibers at one face with nanofibers present throughout the structure. This is described in col. 9, lines 31-45 with the build up of nanofibers in line 42. Claims 117, 118, 120, 121, 123, 124, 126, 127, 130 and 131 are rejected because glass fibers are flexible and Fischer teaches the use of polymeric fibers. Claim 129 is rejected as the scaffold fibers may make up to 99 weight percent of the filter (col. 10, lines 1-9).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 105 and 111-113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer (US 5,800,706) as applied to claim 106 above, and further in view of Wilson et al. (US 6,321,915 B1). The invention of Fischer is silent as to a third set of coarse fibers to provide additional scaffolding support in particular to the larger microfibers.

a. Wilson et al. disclose filter media which is capable of operating in the micro- and nanofiltration regimes offering low cost, durability, high temperature and chemical resistance, high permeability high flow rate, low pressure drop across the filter media, high mechanical strength, separation efficiency and biocompatibility (abstract). The filter may comprise ceramic fibers and inorganic whiskers (col. 6, lines 43-57). One embodiment of the media structure has a trimodal composition with fibers with diameters from about 5 to 20 microns, about 0.1 to 0.3 microns and about 0.03 to about 0.06 microns (col. 15, lines 5-35).

b. Since Fischer and Wilson et al. are from the same field of endeavor (i.e. filters), the purpose disclosed by Wilson et al. would have been recognized in the pertinent art of Fischer.

c. It would have been obvious to one of ordinary skill at the time of the invention to have made the packed bed of Fischer with a third grouping of coarse fibers in the 5 to 20 micron diameter range, as set forth in Wilson et al., which is larger than those previously mentioned with the motivation of forming a packed bed structure from nanofibers with

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enhanced fluid flow characteristics as a result of the scaffolding effect provided by the added coarse fibers. This concept serves as the motivation for the invention of Fischer (col. 2, lines 34-44). This scaffolding effect would be further enhanced by providing a third set of larger diameter fibers with the most preferred size of greater than 5 microns (col. 7, lines 15-19, Fischer). The largest fibers would serve as a scaffold in the same manner as the aforementioned scaffold particulates support the nanofibers and provide the filter with the enhanced properties of Wilson et al. (abstract).

b. Claims 111-113 are rejected as nanofibers would necessarily behave in the claimed manner based upon the methods used in the manufacturing process used to make the packed beds (Examples 4 and 5). The coarse fiber act as a scaffold for the nanofibers, therefore the structure of claims 105 and 111 are met. The structure of claim 112 is met as it is reasonable to presume that some of the some of the nanofibers will cling to the coarse fiber, especially if they are of the same composition. The structure of claim 113 is met as the method of making the packed bed would necessarily result in a uniform dispersion of the nanofibers throughout the packed bed. Claims 114 and 115 are rejected because glass fibers are flexible and Fischer teaches the use of polymeric fibers.

5. Claims 119, 122, 125 and 128 and 132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer (US 5,800,706) as applied to claims 106 and 129 above, and further in view of Chung et al. (US 2003/0106294 A1). Fischer discloses the use of polymeric nanofibers, but fails to teach the specific composition of the nanofibers.

a. Chung et al. teach the use of polymeric micro- and nanofibers for use in filters (abstract). Polymers available for use include nylon, polyester and polypropylene [0037].

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- b. Since Fischer and Chung et al. are from the same field of endeavor (i.e. nanofiber filters), the purpose disclosed by Chung et al. would have been recognized in the pertinent art of Fischer.
 - c. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to have looked to Chung et al. for polymers fibers motivated by the desire to select polymers that are useful in filters.
 - d. Claim 132 is rejected as Fischer discloses that the scaffold fibers can have either the same or different composition as the nanofibers (col. 7, lines 40-44).
6. Claim 116 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer (US 5,800,706) in view of Wilson et al. (US 6,321,915 B1) as applied to claim 105 above, and further in view of Chung et al. (US 2003/0106294 A1). Fischer discloses the use of polymeric nanofibers, but fails to teach the specific composition of the nanofibers.
- a. Chung et al. teach the use of polymeric micro- and nanofibers for use in filters (abstract). Polymers available for use include nylon, polyester and polypropylene [0037].
 - b. Since Fischer and Chung et al. are from the same field of endeavor (i.e. nanofiber filters), the purpose disclosed by Chung et al. would have been recognized in the pertinent art of Fischer.
 - c. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to have looked to Chung et al. for polymers fibers motivated by the desire to select polymers that are useful in filters.

Response to Arguments

7. Applicant's arguments filed 4/18/2007 have been fully considered but they are not persuasive. Arguments pertaining to claim 105 and those dependent from claim 105 have been considered, but are considered moot based upon the new ground of rejection.

8. Applicant argues that Examiner has improperly taken the position that any teaching in the art whereby a first material is used for coarse fibers and a second different material is used for nanofibers will inherently meet the limitations in claims 106 and 107. This is a mischaracterization of Examiner's position. Examiner has stated that inorganic fibers, such as ceramics, and carbon nanofibers inherently possess different wettabilities. Fischer discloses the use of inorganic fibers and carbon nanofibers. Therefore, Fischer anticipates the properties set forth in claims 106 and 107.

9. Applicant argues that Fischer does not teach or suggest that the scaffold particulate and the nanofiber must have different compositions. As pointed out by Applicant, Fischer does in fact teach that the scaffold particulate and nanofibers can have different compositions. This teaching is sufficient to anticipate such a limitation.

10. Applicant argues that Fischer fails to teach or suggest the selection of materials for the nanofibers and coarse fibers in order to create a charge differential in a given fluid to provide a localized electric field in the filter media to enhance filtration. Fischer provides for nanofibers and scaffold fibers of differing composition and said nanofibers/fibers are of the same composition as those of Applicant. Therefore, they would possess the same triboelectric properties as those instantly claimed. Their combination as outlined above would provide for the instantly claimed localized electric field. Furthermore, the surface chemistry, structure or

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composition of the scaffold particulate may also be modified to enhance or adjust the scaffolding effect, which in turn affect the triboelectric properties of the scaffold fibers.

11. Applicant argues that Fischer's disclosure of isotropic properties contradicts the limitations set forth in claim 109. As pointed out supra, Fischer also discloses an embodiment in which nanofibers are present throughout the filter, but also have accumulated at the bottom face of said filter (col. 9, lines 31-45). This anticipates the structure of claim 109.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew D. Matzek whose telephone number is 571.272.2423. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 571.272.1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

mdm



Terrel Morris
Supervisory Patent Examiner
Group Art Unit 1771